

CENTRAL INTELLIGENCE AGENCY

INFORMATION REPORT

This Document contains information affecting the National Defense of the United States, within the meaning of Title 18, Sections 793 and 794, of the U.S. Code, as amended. Its transmission or revelation of its contents to or receipt by an unauthorized person is prohibited by law. The reproduction of this form is prohibited.

SECRET
SECURITY INFORMATION

25X1

COUNTRY	USSR (Kalinin Oblast)	REPORT	
SUBJECT	Electrical Design Project at Institute No. 88, Gorodomlya Island	DATE DISTR.	21 May 1953
DATE OF INFO.		NO. OF PAGES	4
PLACE ACQUIRED		REQUIREMENT	
		REFERENCES	

25X1

25X1

THE SOURCE EVALUATIONS IN THIS REPORT ARE DEFINITIVE.
THE APPRAISAL OF CONTENT IS TENTATIVE.
(FOR KEY SEE REVERSE)

25X1

Moment Transmitter

1. [] design an actuator or drive system for the Bahnmodell, which had been developed by the Germans on the island of Gorodomlya. The actuator consisted of a pair of moment transmitters (Momentgeber) designed to conform to the following specifications:
 - a. Torque or torsional moment of at least four kg cm for a pair of transmitters.
 - b. Diameter of the movable part of the actuator was not to exceed 400 mm.
 - c. Diameter of the complete unit was not to exceed 550 mm.
 - d. Rotary moment was to be constant across the entire travel (plus-minus 20 degrees) of the movable coil.

25X1

USAF review completed.

SECRET

STATE	#X	ARMY	#X	NAVY	#X	AIR	#X	FBI		AEC							
-------	----	------	----	------	----	-----	----	-----	--	-----	--	--	--	--	--	--	--

(Note: Washington Distribution Indicated By "X"; Field Distribution By "#")

25 YEAR RE-REVIEW

25X1

SECRET

25X1

- 2 -

- e. No sliding parts were to be incorporated into the unit.
 - f. The movable coil was to be designed for a maximum current of $I_s = 50$ ma and $V_s = 250$ volts.
 - g. An auxiliary direct voltage of $V_e = 120$ volts was to be used for the exciter coils.
2. The Unipolar work principle was chosen for the moment transmitter since this system, by virtue of its specific construction, offered the greatest prospects for a constant rotary moment. It was predetermined that the rotation angle would not be excessive. In the Unipolar system, the core, curved in the shape of an arc sector, formed one pole, and an identically formed pole arc formed the second pole of the magnetic system. A free swinging coil encircled the core. The core therefore move in a field between the core and the pole arc. If a current I_s passed through the coil, the coil moved in the current direction to either one side or the other with a force which was directly proportional to the coil current I_s . The moment which effected the rotary system of the Bahnmodell was computed according to the Biot-Savart Law:

$$M_D = 1.02 \times B_L \times W \times l_w \times I_s \times a \times 10^{-7} \text{ Kg cm}$$

Where:

 B_L equals the induction in air cavity (or space) W equals the number of windings l_w equals the median winding length (length of average winding) in cm I_s equals the coil current in amperes a equals the length of lever arm in cm

3. As shown in the drawing [see sketch on p. 4] the swinging coil moves in a space between the rectangular pole core and the U-formed pole arc. The exciters are arranged between the pole arc and the magnetic return (yoke arc). The swinging core is divided into two halves which are inclined at a 15° angle in order to conform to the curved formed air gap. Each half of the coil contains two windings, each winding having 2,500 turns (wire diameter 0.1 mm). The coil bobbin was built as light as possible in order to decrease the added inertia moment. In order to eliminate possible eddy currents, no metal parts were used for the portion of the coil which moved in the air gap. The following prerequisites govern this particular feature of the unit:
- a. Equal air gap induction along the entire pole arc; that is, equal air gap distances between the core and pole arc at every point.
 - b. Inductions must lie below the break of the magnetization curve in the core and in the pole arc.
4. $B_L = 5,000$ gauss (measure of magnetization) was established for the induction air gap. The core, pole arc, and yoke arc were dimensioned in such a manner that the induction in these parts lay below 8,000 gauss.

25X1

SECRET

SECRET

- 3 -

25X1

5. The torsion moment of a pair of transmitters which were built into the Bahnmodell was approximately 7.2 kg. cm. as opposed to 1.1 kg. cm. obtained by former design. The torsion moment which was developed from the transmitter was accurate to a plus-minus 1.5% constant in an angle range of approximately plus-minus 23°. After satisfactory tests were run on the moment transmitter, it was installed in the Bahnmodell.

25X1

SECRET

